

# Claims

- [c1] A method of detecting loss of signal on a pair of differential signal lines operable to carry a differential signal, comprising:
- detecting a common mode level from voltages on said pair of differential signal lines;
  - generating a threshold level referenced to said detected common mode level;
  - generating a signal level from the voltages on said pair of differential signal lines, said signal level being averaged over a first period of time;
  - generating a reference level from said threshold level and said detected common mode level, said reference level being averaged over a second period of time longer than said first period of time;
  - comparing said signal level to said reference level to determine if a signal is present on said pair of signal lines.
- [c2] The method of claim 1 wherein said signal level is averaged by charging said signal level with a charge pump operated by said voltages on said pair of signal lines.
- [c3] The method of claim 2 wherein said reference level is averaged by charging said reference level with a charge

pump operated by said threshold level and said common mode level.

- [c4] The method of claim 1 wherein said comparing is performed by a self-biased comparator.
- [c5] The method of claim 1 further comprising buffering levels on a pair of conductors to generate said voltages on said pair of signal lines.
- [c6] The method of claim 5 wherein said buffering shifts a common mode level on said pair of conductors to a different common mode level on said pair of signal lines.
- [c7] The method of claim 1 wherein said buffering is performed by connecting said conductors to a peaking differential amplifier having a peak sensitivity which is adjustable to a switching frequency of said pair of differential signals adapted to be carried by said pair of signal lines.
- [c8] The method of claim 1 wherein said threshold level is generated by programmably adjusting a bias current to generate a resistive voltage drop referenced to said common mode level.
- [c9] The method of claim 1 wherein said threshold level is generated by programmably adjusting a resistance of a

resistive element to generate a voltage drop referenced to said common mode level.

[c10] The method of claim 1 wherein said threshold level is a first threshold level at a higher voltage than said common mode level, said reference level being generated from said first threshold level, said method further comprising generating a second threshold level at a lower voltage than said common mode level, generating a second reference level from said second threshold level, and comparing said signal level to said second reference level to determine if a signal is present on said pair of signal lines.

[c11] The method of claim 1 wherein said common mode is detected by resistively dividing a voltage difference between said voltages on said pair of signal lines.

[c12] The method of claim 1 wherein said comparing determines that no signal is present when said signal level does not exceed said reference level.

[c13] A method of detecting loss of signal on a pair of conductors adapted to carry a pair of differential signals, comprising:  
generating voltages on a pair of signal lines by buffering levels on a pair of conductors;

detecting a common mode level of said voltages on said pair of signal lines;  
generating a threshold level referenced to said detected common mode level;  
generating a short-term averaged signal level by operating a first charge pump with said voltages on said pair of signal lines;  
generating a reference level averaged over a longer term than said signal level by operating a second charge pump with said threshold level and said common mode level;  
comparing said signal level to said reference level to determine if a signal is present on said pair of signal lines, said comparing determining that a signal is not present when said signal level is less than or equal to said reference level.

- [c14] An apparatus for detecting loss of a signal on a pair of signal lines adapted to carry a pair of differential signals, comprising:
- a detector operable to detect a common mode level of voltages on a pair of signal lines;
  - a threshold level generator operable to generate a threshold level referenced to said detected common mode level;
  - a first charge pump operable by said voltages on said

pair of signal lines to generate a short-term averaged signal level;  
a second charge pump operable by said threshold level and said common mode level to generate a reference level averaged over a longer term than said signal level;  
and  
a comparator operable to compare said signal level to said reference level to determine if a signal is present on said pair of signal lines.

[c15] The apparatus of claim 14 further comprising an amplifier operable to buffer levels on a pair of conductors to generate said voltages on said pair of signal lines.

[c16] The apparatus of claim 15 wherein said amplifier is further operable to shift a common mode level on said pair of conductors to a different common mode level on said pair of signal lines.

[c17] The apparatus of claim 15 wherein said amplifier includes a peaking differential amplifier having extended bandwidth, said peaking differential amplifier being operable to shift a common mode level on said pair of conductors to a different common mode level on said pair of signal lines.

[c18] The apparatus of claim 14 wherein said comparator is a

self-biased comparator.

- [c19] The apparatus of claim 14 wherein said threshold level generator includes a programmably adjustable bias current generator for use in generating said threshold level by a resistive voltage drop referenced to said common mode level.
- [c20] The apparatus of claim 14 wherein said threshold level generator includes a programmably adjustable resistive element for use in generating said threshold level by a resistive voltage drop referenced to said common mode level.
- [c21] The apparatus of claim 14 wherein said threshold level is a first threshold level at a higher voltage than said common mode level and said second charge pump is operable to generate said reference level from said first threshold level, said threshold level generator further being operable to generate a second threshold level lower than said detected common mode level, said second threshold level being referenced to said detected common mode level, said apparatus further comprising a third charge pump operable by said second threshold level and said common mode level to generate a second reference level averaged over a longer term than said signal level, said comparator being a first comparator,

said apparatus further comprising a second comparator operable to compare said signal level to said second reference level to determine if a signal is present on said pair of signal lines.

[c22] The apparatus of claim 14 wherein said detector is operable to detect said common mode by resistively dividing a difference between said voltages on said pair of signal lines.

[c23] The apparatus of claim 14 wherein said comparator is operable to determine that no signal is present when said signal level does not exceed said reference level.

[c24] An apparatus for detecting loss of a signal on a pair of signal lines adapted to carry a pair of differential signals, comprising:

means for detecting a common mode level of a pair of voltages on a pair of signal lines;

means for generating a threshold level referenced to said detected common mode level;

means for generating a short-term averaged signal level with said voltages on said pair of signal lines;

means for generating a reference level averaged over a longer term than said signal level; and

means for comparing said signal level to said reference level to determine if a signal is present on said pair of

signal lines.

- [c25] The apparatus of claim 24 wherein said means for generating said signal level is operable to average said signal level with a first charge pump operated by said voltages on said pair of signal lines.
- [c26] The apparatus of claim 25 wherein said means for generating said reference level is operable to average said reference level with a second charge pump operated by said threshold level and said common mode level.
- [c27] The apparatus of claim 24 further comprising means for buffering levels on a pair of conductors to generate said voltages on said pair of signal lines.
- [c28] The apparatus of claim 27 wherein said means for buffering is further operable to shift a common mode level of said voltages on said pair of conductors to a different common mode level on said pair of signal lines.
- [c29] The apparatus of claim 28 wherein said means for buffering includes a peaking differential amplifier connected to said pair of conductors, said differential amplifier having a peak sensitivity which is adjustable to a switching frequency of a signal which said pair of signal lines are designed to carry.

- [c30] The apparatus of claim 24 wherein said means for generating said threshold level includes programmably adjustable bias current means for generating a resistive voltage drop referenced to said common mode level.
- [c31] The apparatus of claim 24 wherein said means for generating said threshold level includes a programmably adjustable resistive element for generating a resistive voltage drop referenced to said common mode level.
- [c32] The apparatus of claim 24 wherein said means for detecting said common mode level includes means for resistively dividing a difference between said voltages on said pair of signal lines.
- [c33] The apparatus of claim 24 wherein said means for comparing is operable to determine that no signal is present when said signal level is the same as said reference level.
- [c34] The apparatus of claim 24 wherein said means for comparing is operable to determine that no signal is present when said signal level is below said reference level.